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From: Adria Huseth, National Pork Board

National Pork Board
1776 NW 114th Street, Clive, Iowa 50325
pork.org | Toll-free: 800-456-7675 | Phone: 515-223-2600 | Fax: 515-223-2646

October 11, 2016

Re: Volume 81, No. 175 – Request for information on consumption of red meat, processed meat and meat cooked at high temperatures:

Department of Health and Human Services: National Institutes of Health: Nominations to the National Toxicology Program for the Report on Carcinogens and Office of Health Assessment and Translation; Request for Information:

The National Pork Board appreciates the opportunity to provide evidence regarding the production and consumption of red and processed meat in the United States.

There are limited sources of data for red and processed meat exposure available to the National Toxicology Program's (NTP) request for information and all vary with regard to timeliness, accuracy and specificity. The most accessible sources of red and processed meat data available to the NTP's request are the Food Balance Sheets provided by FAO.[1] These data are gross measures of food availability and thus overestimate intake and provide little specificity with regard to consumption of further processed products. A recent publication comparing intake estimations using FAO data vs. Global Dietary Database (GDD), found world-wide estimates of red and processed meat intake to be 2.2 times higher with FAO as compared to the GDD.[2] The GDD appears to provide more precise intake data than the FAO, but the database is not publically available (i.e. limited to research group members), almost half of the dietary surveys used were collected prior to the year 2000, and food groups are broad and not clearly defined, thus limiting data specificity for red and processed meat. "Meat" is a broad food category that is ambiguous in nutritional epidemiology. Observational studies commonly report intake of "red meat" or "red and processed meat" without further definition and there is often no intake data to distinguish fresh meat from processed meat or lean meat from higher fat sources. "Processed meat" often reflects a combination of red meat and poultry-based products, but these are rarely reported separately in observational studies.[3] For example, "processed meat" intake was recently estimated using the GDD, but the authors do not specify if this is red processed meat only or any processed meat.[4] Reliance on GDD data that may be 15 or more years old, also limits the relevancy of this data to today's leaner beef and pork supply and changes in the formulation of processed meat to include less sodium and chemical preservatives.

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[1] http://faostat3.fao.org/browse/FB/*/E
[2] Del Gobbo et al. 2015. Assessing global dietary habits: a comparison of national estimates from the FAO and the Global Dietary Database. Am J Clin Nutr doi:10.3945/ajcn.114.087403
[3] McNeill SM and Van Elswyk, ME. Meat: Role in the Diet. Encyclopedia of Food and Health, *in press*.
[4] Imamura et al., 2015. Dietary quality among men and women in 187 countries in 1990 and 2010: a systematic assessment. Lancet Glob Health, Mar;3(3):e132-42. doi: 10.1016/S2214-109X(14)70381-X.

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As a member of the International Meat Secretariat (IMS), I am able to provide the most accurate production and intake estimations for red and processed meat for the United States. I've included an annotated bibliography of publically available publications and reports of red and processed meat intake. This information is the result of the U.S. food consumption survey data; National Health and Nutrition Examination Survey. For each food reported in NHANES 2003-2006, the USDA Food and Nutrient Database for Dietary Studies (FNDD) databases provided information on the amount of energy and approximately 60 nutrients or food constituents per 100 g of each food. The NHANES 2003-2006 respondents, 16,783 individuals, reported consumption of approximately 5,000 specific foods; each food was identified by USDA by a unique 8-digit food code. Assessed dietary intake by U.S. population age 2 years and older and the following sub-populations: children 2-5, males and females 6-11, 12-18, 19-39 and 40+ were derived from two, 24-hour dietary recalls for each subject. Pork-based foods were classified into two categories: processed pork and fresh pork.

Generally speaking, our findings can be summarized as follows:

- The average intake of total pork in the United States per capita is 29.2 g per day
- The average intake of fresh pork per capita is 7.5 g per day
- The average intake of lean pork per capita is 10.7 g per day
    - Per FDA's definition of lean, according to reference *21 CFR 101.62(e)(1)-(3),* on seafood or game meat products that contain less than 10g total fat, 4.5g or less saturated fat, and less than 95mg cholesterol per RACC and per 100g
- The average intake of processed pork per capita is 21.7 g per day

There are studies linked to cooking meat at high temperatures which can produce heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs). HCAs and PAHs exposure has been studied in animal models. However, the doses of HCAs and PAHs used in these studies were very high; equivalent to **thousands of times the doses that a person would consume** in a normal diet. Human studies have not established a definitive link between HCA and PAH exposure from cooked meats and cancer in humans. No specific guidelines for HCA/PAH consumption exist. The National Pork Board recommends not overcooking pork to achieve a tender and flavorful product. For pork cuts such as roasts, chops and tenderloin, cook to an internal temperature of 145 degrees F., plus a 3-minute rest. There are several ways to reduce HCAs and PAHs when grilling or pan frying meat that include; trim fat to reduce drips and flavor meats with marinades and rubs. Scientists believe the antioxidants in marinades block HCAs from forming. Herbs including basil, mint, sage and oregano may have similar effects. In addition, avoiding direct exposure of meat to an open flame or a hot metal surface, avoiding prolonged cooking times at high temperatures, continuously turning meat over on a high heat source and removing charred portions of meat can also reduce HCA and PAH exposure.

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Research continues to show that not smoking, responsible alcohol consumption, maintaining a healthy weight and regular physical activity are much more important to cancer risk than eating any individual food. It is also important for individuals to adhere to screening recommendations, recommended clinical examinations and follow-up appointments with their medical professionals.

Again, I appreciate the opportunity to provide this evidence. Also, I would like to offer myself as a resource to the NTP group as they continue to deliberate their request for information on red and processed meat.

Adria Huseth, RD, LD, CPT
Manager of Nutrition Communications & Research
National Pork Board
ahuseth@pork.org
515-223-2632

Publication Citation

Murphy, M., Spungen, J., Bi, X., & Barraj, L. "Fresh and fresh lean pork are substantial sources of key nutrients when these products are consumed by adults in the United States." Nutrition Research/Volume 31.Issue 10 (2011): 776-783.

KEY FINDINGS FROM PUBLICATION:

Selection of fresh, lean pork cuts can help fulfill nutrient needs provided by the protein foods group while also helping to limit energy intake.

- Energy intakes by consumers of fresh lean pork were comparable to intakes by non-consumers of fresh lean pork who are presumably selecting alternate foods from the protein group.
- Fresh lean pork accounts for 23% of total protein intake and 25% or more of total intakes of selenium and thiamin while contributing only 7% of total energy intake and 9% of total fat intake on a day of consumption.
- Fresh lean pork accounts for 10% or more of total intakes of phosphorous, potassium, zinc and B vitamins including riboflavin, niacin, vitamin B6 and vitamin B12 on a day of consumption.

Americans are consuming fresh and fresh lean pork at levels within the total amount that is recommended in the protein foods group by current dietary guidance.

- On a day of consumption, US adults eat 3.2 ounces of fresh pork or 2.5 ounces of fresh lean pork, which are levels within the 5.5 ounce equivalents a day of total protein foods recommended for adults consuming 2,000 calories per day.

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Energy-adjusted intakes of dietary fat by fresh and fresh lean pork consumers on a day of consumption are not different than those of non-consumers of these pork products.

- On a day of consumption, fresh pork accounted for 16% of total fat intake among consumers of fresh pork, while fresh lean pork accounted for 9% of total fat intake among consumers of fresh lean pork.
- Results of this study show no differences in calorie-adjusted intakes of total fat or saturated fat intake between fresh or fresh lean pork consumers and non-consumers of these products.

Selection of fresh, lean pork products by adults not currently eating these products could positively increase dietary variety without adversely affecting nutrient intake.

- Results of this study show that diets including fresh or fresh lean pork provide higher calorie-adjusted amounts of important nutrients like protein, selenium, thiamin and vitamin B6 compared to diets of adults not including these products, while still providing comparable energy-adjusted amounts of total and saturated fat. Dietary guidance recommends selection of lean or low-fat meats; fresh lean pork is consistent with this recommendation and therefore could help increase dietary variety.

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